

Department of Ecology

Water Rights Impairment Analysis Guidance
For
Reclaimed Water Facilities

February 2006

Introduction

This guidance describes a suggested process for conducting an impairment analysis under the State of Washington's Reclaimed Water law (Chapter 90.46 RCW). The purpose of the impairment analysis is to evaluate the potential impairment of water right holders when a facility begins to reclaim water rather than discharge it. It is the responsibility of the project proponent to complete the analysis and it must be completed for all projects.

This document provides guidance, and is intended to assist both project proponents and Department of Ecology staff in establishing a clear process for the analysis. It is important to stress that every reclaimed water project is different, and therefore every impairment analysis will be different. There will inevitably be unique issues or concerns which arise when planning and implementing each project, and these issues or concerns will need to be dealt with in ways not expressly covered in this document. Therefore, both the facility performing the analysis and the Ecology permit writer are free to use best professional judgment in using and/or modifying the following procedure if it becomes necessary.

Permitting and Statutory language

The owner of the wastewater treatment facility reclaiming the water with a permit issued under the Reclaimed Water law (Chapter 90.46 RCW) has the exclusive right to any reclaimed water generated by the facility. The law exempts reclaimed water facilities from obtaining a water right permit under the Water Code (Chapter 90.03 RCW) for reuse of the water.

RCW 90.46.130 states, "Facilities that reclaim water under this chapter shall not impair any existing water right downstream from any freshwater discharge points of such facilities unless compensation or mitigation for such impairment is agreed to by the holder of the affected water right."

What is Impairment?

Impairment is a condition caused by someone or something other than a natural condition where a water right holder cannot carry out the beneficial use(s) for which the right was perfected using reasonable care and diligence. Ecology considers a reclaimed water impairment analysis in the same context as the issuance of a new water right pursuant to RCW 90.03.290 and RCW 90.44.060.

Complete The Impairment Analysis Early

Regardless of the type of reclaimed water project, an impairment analysis is required by the project proponent.

Ecology recommends submitting the impairment analysis as early as possible in the planning process. The analysis is typically submitted to the department as a component of a facility plan or engineering report. Proponents may receive approval of a wastewater facility plan that considers reuse without completing an impairment analysis. However, an impairment analysis must be completed to comply with SEPA and the analysis must be approved by the Water Resources Program in order to obtain a reclaimed water permit. Depending on the status of a community's sewer planning efforts, an iterative process may be most appropriate. The proponent may complete a scoping analysis at the initial stages of a reclaimed water project, followed by a more detailed assessment when reclaimed water appears feasible.

The facility should contact Ecology water quality and water resources staff early on for coordination and technical assistance. Ecology encourages the project proponent to work closely with water resources staff at any point in the process if considerable uncertainty exists regarding the 7-step procedure outlined below.

Existing Facilities

Prior to modifying a reclaimed water permit to allow additional beneficial uses and/or an increase in the quantities of water reclaimed at an existing facility, a new impairment analysis will be required. The new uses will only be allowed if they result in no impairment, OR compensation/mitigation has been agreed to by impaired water right holders.

Indications of a Relatively Simple Impairment Analysis

In some cases the scope of the impairment analysis may be extremely limited. If existing wastewater discharge has historically been 100% consumptively disposed¹, the analysis could be halted after performing step one in the procedure section below and providing documentation to this effect. Similarly, if all discharged flows are foreign to the basin, the facility need only perform step one. If it can be shown that there are no downstream water rights in the final study area, a completion of the analysis to step four would be sufficient.

Indications of a Relatively Complex Impairment Analysis

Projects whose historic discharge is to a basin with the one or more of the following characteristics increases the likelihood that a complex impairment analysis is likely, and/or the "compensation or mitigation" portion of RCW 90.46.130 will likely be necessary:

¹ Examples of discharge that is 100% consumptively disposed include discharges to marine waters or some land application systems.

- Basins closed to further appropriations by Ecology
- Basins with instream flows adopted by rule
- Aquifers with declining water levels
- Aquifers designated as ground water management areas
- Streams that go dry or are regulated each year according to priority date.

Furthermore, the potential for impairment can be as much a function of the physical withdrawal structure used by a water right holder as it is a function of lack of water in the stream. Surface water right holders must exercise all reasonable diligence in withdrawing their allotted water if it is flowing in the stream. An “impact” to stream flow caused by a reclaimed water project does not necessarily rise to the level of “impairment”. Therefore it is not unreasonable to expect water right holders to adjust their withdrawal facilities in response to changes in stream flow caused by a reclaimed water project in the same manner as they would adjust diversion structures in response to changes in stream conditions due to drought or channel migration.

Instances with complex analyses are not limited to these situations alone. The facility should contact Ecology Water Resources staff if unsure of the appropriate extent of the analysis.

Instream Flow Water Rights Are Included

The presence of instream flows can make a project more challenging to implement. The State is the holder of instream flow rights adopted by rule and has the authority to protect these flows. A reduction of stream flow that conflicts with or reduces the beneficial uses or purpose(s) of the adopted in-stream flow is an impairment to the state’s instream flow water right. Therefore, the impairment of an instream flow should be characterized by assessing any quantitative effects on the flow and aquatic resource impacts to the source. As holder of the instream flow right for the public’s benefit and issuer of the reclaimed water permit, Ecology does have some flexibility in how it addresses this impairment. If a reclaimed water project is proposed in a basin having adopted flows, the proponent is encouraged to consider the following options, and to do so as early in the planning process as possible.

One option is to condition the reclaimed water permit as interruptible if removal of effluent results in any reduction of flows below the legal in-stream flow at any time of the year (i.e. interruptible during the summer months). This is similar to the condition placed on the diversion for a junior water right when instream flows are not met.

As another alternative, it may be possible for the project proponent to provide compensation or mitigation to prevent the impairment of the instream flow right. The adequacy of mitigation is very case-specific. Some form of out-of-kind mitigation that preserves the full extent of the beneficial uses associated with the adopted instream flow could be considered.

It is also within the Ecology Director’s authority to determine that a project constitutes an overriding consideration of the public interest (OCPI) and elect to not assert the State’s

instream flow right in favor of the proposed project. OCPI cases in particular have been only used in the State a handful of times, and should not be counted on as a viable option for most projects.

Surface Water/Ground water Continuity Must Be Considered

Surface water/ground water continuity must be considered in an impairment analysis. The rule governing protection of ground water withdrawal facilities, [Ch. 173-150 WAC](#), identifies how qualifying withdrawal facilities for ground water rights may be impacted by a project. In general, a well must fully penetrate an aquifer in order to qualify for impairment protection. If it does not, the shallow well user cannot claim impairment when the use of water by another water right holder with a deeper well reduces or eliminates available water in the shallow well. The same principle holds true if a reclaimed water project reduces the flow in a stream such that a shallow well in hydraulic continuity with the stream is affected. Such a situation is not impairment unless the well fully penetrates the source aquifer.

Procedure May Differ in Adjudicated vs. Non-Adjudicated Basins

The impairment analysis procedure will often depend upon whether the water rights in the basin 1) have been confirmed in an adjudication and are actively regulated through the priority system or 2) are non-adjudicated, and less certainty exists regarding Ecology's authority to regulate between water right holders. The facility is encouraged to work with water_resources staff to determine which type of basin their project is located in before proceeding.

Non-Adjudicated Basins

The assessment of impairment performed in a non-adjudicated basin requires the evaluation of all water rights in the final study area (defined below) because the relative priority of junior and senior water rights has not been established with finality by a Superior Court. Ecology can only perform a tentative determination of the extent and validity of non-adjudicated water rights. Therefore, for steps 3, 4 and 5 below, the procedure under the subheading "Non-Adjudicated Basins" should be followed.

Adjudicated Basins

The assessment of impairment performed in an adjudicated basin may be technically simpler because all downstream rights may not need to be directly assessed for impairment. Often these basins are regulated each year according to priority, which requires more recent or "junior" water right holders to cease all or part of their withdrawals in favor of older or more "senior" water right holders in times of a water shortage. In these basins, any increase in consumptive use will often lead to impairment of a junior water right holder because the senior water right holders will have to "call" for the junior users to curtail use more frequently, or sooner. Therefore, the impairment analysis can start with the most junior downstream water right holder and proceed in an iterative fashion to the next most junior right until it is determined that the removal of the

waste discharge will not result in that right being shut off or “called” any more often. For the purposes of the impairment analysis, such rights will be called “indicator rights” because evaluating them can serve as an indicator of the potential susceptibility of other rights to impairment. It is important to note that water rights that perfected their uses prior to the wastewater discharge may be omitted from the analysis if they cannot assert reliance on the discharge, a necessary component for an impairment claim in an adjudicated basin. Ecology’s Water Right Tracking System (WRTS) can be used to assist project proponents in determining water rights within the study area.

In addition to so-called indicator rights, it is also possible to evaluate the likelihood of impairment by assessing the water budget at one or more “control points” downstream of the discharge. A control point might be a dam and reservoir with a prescribed release or some other water control/regulation mechanism that adds or removes a specified amount of water to the system. If the reduction in discharge associated with a reclaimed water project affects the water budget of such a control point (i.e. the input of water affects the required output), then it may be possible to conclude that impairment of rights downstream of the control point may occur.

7-Step Procedure for Completing An Impairment Analysis

The following 7-Step procedure may be used to evaluate the potential for impairment of a proposed reclamation facility. Depending on the specifics of your project, you may not need to complete all 7 steps.

- For projects where the historic discharge has been consumptively disposed or where the discharge is based on foreign flows, complete only Step 1.
- For projects in adjudicated or otherwise regulated basins, complete all 7 steps, but utilize the adjudicated basin discussion above for steps 3, 4 and 5.
- For projects in non-adjudicated basins, complete all 7 steps.

While this 7-Step procedure is one way to evaluate impairment, there may be others that are acceptable and Ecology will review the methodology selected by the project proponent. Ultimately, it is the definition of impairment provided herein that will govern whether any particular method selected will adequately predict the impacts of a proposed facility.

Step 1 Determine the characteristics of the historical wastewater discharge and disposal method. A multi-year discharge hydrograph should be provided in the analysis. The total amount of water discharged as represented in this hydrograph (Q_{total}) represents a baseline number from which calculations are made to determine the amount of water for which the facility must perform the impairment analysis before reclaiming it (Q_{impair}). In order to determine the value of Q_{impair} , it is especially important to determine whether any portion of the original source water for the wastewater discharge is from another basin or aquifer. Such flow may be considered “foreign” ($Q_{foreign}$) and water right holders downstream of the discharge may not have a right to rely upon such flows. This would include water obtained from water rights located in basins other than the basin of

discharge. Such water should be subtracted from Q_{total} , and may be reclaimed without going further with the impairment analysis. If there is a foreign component to the discharge, any infiltration and inflow water (Q_{ii}) that is foreign to the basin should also be subtracted from Q_{total} . Otherwise, no quantification of Q_{ii} is necessary. Additionally, any water discharged to marine waters (Q_{marine}) or otherwise disposed of in another fully consumptive manner ($Q_{consumed}$) may be subtracted. The following equation mathematically outlines the procedure described above:

$$\text{Equation 1. } Q_{impair} = Q_{total} - Q_{marine} - Q_{consumed} - (Q_{foreign} + Q_{ii})$$

If $Q_{impair} = 0$, then no further impairment analysis is required and the total historic discharge can be reclaimed. If the amount of water to be reclaimed is less than or equal to Q_{marine} or $Q_{consumed}$, then no impairment is technically possible, but details of the project must be provided in sufficient detail that this can be shown. If $Q_{impair} > 0$, then the facility must perform the rest of the impairment analysis on the amount of discharge water to be reclaimed that is less than or equal to Q_{impair} . This final amount available for reclamation will be called Q_{free} , and calculating it will be done in a later step.

Step 2 Determine an initial study area around the historical discharge point based on the geographic and geologic boundaries for the analysis. Geologic boundaries should be based on hydraulic barriers to water flow, including faults, folds, confining layers and other geologic features. Geographic boundaries should be based on topography and watershed boundaries of the surface system to which the effluent has been historically discharged. For ground water, selection of the initial study area is done in the same manner as determining the same body of ground water under RCW 90.44.100 plus any associated surface water bodies. A map should be provided along with a verbal description of this area.

Step 3

Non-adjudicated Basin: Establish the location of a downstream effluent influence limit that is sufficiently separated by distance from the historical discharge point as to make impairment extremely unlikely. One way to do this is to compare the maximum instantaneous quantity of wastewater to be reclaimed (less than or equal to Q_{impair}) with the 7 day, 10 year low flow (7Q10) in the receiving water body². It makes sense to begin measurements at the historical point of waste discharge. If the amount of water to be reclaimed is less than 25% of this minimum flow, it can be argued that this effluent influence limit is essentially at the point of discharge, and impairment of downstream rights is highly unlikely³. As the ratio of reclaimed wastewater to 7Q10 flow increases above 25% however, it becomes increasingly likely that the effluent influence limit is further downstream, and one or more intervening downstream water right holders may be impaired. Natural surface and ground water inputs between the historical point of

² The 7 day, 10 year low flow is being used here to be consistent with WAC 173-201A, which establishes this as a limit of effluent domination when determining appropriate mixing zones in an NPDES permit.

³ One exception is the potential for impairment of an in-stream flow adopted by the Department in rule, for which any reduction may be considered to be impairment.

discharge and the downstream rights may bring the limit closer to the discharge point. Furthermore, return flows (if they can be quantified) may also be considered as net adjustments to downstream diversion rights, and may serve to bring the limit even closer to the discharge point. The facility should gather data and/or perform a modeling analysis to provide evidence for the limit location. This final study area should be delineated on the map detailing the initial study area from Step 2.

The goal of this step is to shrink the size of the initial study area from an entire basin to a smaller portion therein, if at all possible. Outside of this final study area, it is highly likely that no water rights will be impaired.

Adjudicated Basin: Skip to Step 4, Adjudicated Basin subsection.

Step 4

Non-Adjudicated Basin: Identify all existing water rights and water right claims within the final study area. Any downstream water right holder of any priority date in this area whose exercise of a water right relies in whole or in part on the water body to which wastewater has historically been discharged should be evaluated. Ecology has interpreted downstream to mean down-gradient in the context of ground water. Relevant data that should be considered include water right numbers, priority dates, points of withdrawal, instantaneous and annual withdrawal amounts and purposes of use. Water right numbers and points of withdrawal should also be shown in the study area map delineated in Step 3. Ecology water resources staff are available to assist the project proponent in determining the location and characteristics of study area water rights. Instream flows are water rights held by the Department of Ecology and must be included in the list of potentially affected water rights.

Adjudicated Basin: Determine the most appropriate water right to use as a so-called “indicator right” for the impairment evaluation, OR choose a downstream “control point” at which water flowing in the basin is regulated. The indicator right is a right having a point of withdrawal, period of use and/or withdrawal amounts which make it the most likely right to be impaired when Q_{impair} is removed from the stream. Often times it is the closest most junior water right downstream of the historic discharge point, but this may not always be the case. A right having an especially large instantaneous and/or annual withdrawal amount located further downstream might be more likely to be affected than smaller water rights closer to the discharge point. In any event, the facility should be prepared to justify its selection of the “indicator right” verbally and quantitatively, and provide its location on the map from above. If present, Ecology’s instream flow right *must* be used as an indicator right, and the analysis must determine if the loss of Q_{impair} will result in the instream flow being met less often.

Step 5

Non-Adjudicated Basin: Beginning at the point of historic effluent discharge and proceeding downstream to the effluent influence limit, perform the following calculations

for each water right and place it in a table:

- 1) Natural 7Q10 flow at that location
- 2) Augmented flow, $Q_{aug} = 7Q10 \text{ flow plus } Q_{impaired}$
- 3) Instantaneous pumping rate of water right
- 4) $Q_{WR} =$ Cumulative sum of instantaneous water right values from point of discharge to that location plus in-stream flow and trust water rights (if any)
- 5) Reclaimable effluent $Q_{free} = (Q_{aug} - Q_{WR})$, with a lower limit of zero and an upper limit of $Q_{impaired}$.

Any water right location having a Q_{free} of zero or less indicates that the water right will be impaired if any amount of water is reclaimed during the 7Q10 flow. If the facility wishes to minimize the possibility of impairment of water right holders, it should reclaim an amount of water no greater than the smallest calculated Q_{free} of all the water rights in the final study area. Any reclaimed amount greater than the calculated Q_{free} for any given water right will likely impair that water right during low flows. It should be noted again that $Q_{foreign}$ represents water available for reclamation in addition to Q_{free} .

Adjudicated Basin: Evaluate whether the reduced discharge, including timing and frequency of occurrence, will impair the indicator water right under the impairment definition. The formulae described above for non-adjudicated basins may be used for this, but other technical evaluations, analytical formulae or modeling may be necessary or alternatively preferred. If no impairment of the indicator right is found, then it may be appropriate to determine no impairment will occur to any right in the study area based on this worst-case evaluation. If the indicator water right is impaired, further evaluation may be necessary to determine how many other rights would be impaired. This would involve a repetition of steps 5 and 6 for each new “indicator right” until all water rights believed to be facing impairment are identified. Alternatively, the facility could reduce its desired amount of reclaimed water to something less than $Q_{impaired}$ until all potentially affected rights show no impairment.

Step 6 Define an action plan for addressing impaired rights, if any. A facility whose impairment analysis yields rights that will be impaired by the reuse project has several options to consider:

- Whether to “compensate or mitigate” for said impairment as described in RCW 90.46.130. An entity seeking this option should obtain the water right holders concurrence with the project in writing and present such in the plan.
- Whether to alter the project to reduce or eliminate the impairment potential. Modifications to the proposed beneficial uses or to the reuse project design may be possible to address impairment concerns. Phasing of the project may also be possible to provide the community time to explore additional options.
- Whether to postpone the reuse project. Ecology seeks to encourage water reclamation and reuse projects. Facilities who determine that their project will impair other rights may request assistance from Ecology in determining an alternative course of action that may allow the project to move forward.
- Whether to acquire/purchase potentially impaired rights.

- Whether to condemn potentially impaired rights pursuant to RCW 90.03.040.

Step 7 Submit impairment analysis to Ecology for approval. An approved impairment analysis is required before a permit will issue to reclaim water. Ecology's Water Resources Program will typically review an impairment analysis as part of a wastewater facility plan or engineering report that seeks approval for construction of a reclaimed water facility. Ecology's Water Resources Program will approve, or provide comments on the impairment analysis within the prescribed timeframe for plan review.

Roles and Responsibilities

Project Proponent

1. Request Ecology data on water rights, hydrology, ground water levels, and watershed planning.
2. Meet minimum public notice requirements, and consider providing descriptions on impairment analysis.
3. Prepare the impairment analysis.
4. For projects requiring a complex impairment analysis (e.g. all 7 steps), request a pre-plan meeting with Ecology for input.

Ecology Water Resources

Upon request, Ecology Water Resources Staff will:

1. Attend a pre-plan meeting.
2. Provide water rights data, stream flow data or contacts/links thereto, ground water levels collected as part of Ecology's well monitoring program, information on instream flow rules, ground water management areas, and closed basins, and electronic files and maps as available.
3. Review project proponent impairment analysis and provide Water Resources comments for transmission (along with WQ and DOH comments) to project proponent within plan review cycle.